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SMART & BIGGAR
P.O. BOX 2999, STATION D
900-55 METCALFE STREET
OTTAWA, ON K1P5Y6
CANADA

EXAMINER	
BALAOING, ARIEL A	
ART UNIT	**PAPER NUMBER**
2617	

DATE MAILED: 03/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/736,501	WU ET AL.	
	Examiner	Art Unit	
	Ariel Balaoing	2683	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-24 and 26-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-7,11-15,17-24 and 26-31* is/are rejected.

7)☒ Claim(s) *8-10 and 16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see page 7 of the remarks, filed 01/12/2006, with respect to claims 18 and 30 have been fully considered and are persuasive. The 35 U.S.C. 112, second paragraph rejections of claims 18 and 30 has been withdrawn.

2. Applicant's arguments filed 01/12/2006 have been fully considered but they are not persuasive.

Regarding amended claim 2, the applicant argues "Scherzer is concerned with determining an appropriate beam width which results in negligible intra-cell interference and that is completely different than imposing a minimum angle of separation constraint." (see page 8 and 9 of the remarks); the examiner respectfully disagrees. As can further be seen from the abstract and col. 6, line 65-col. 7, line 5, subscriber stations are serviced simultaneously based on their spatial status. Positioning of the subscriber stations are achieved through detection of angle of arrival (col. 7, lines 44-65), which suggests an angle of separation constraint being imposed on the subscriber stations. Servicing of multiple subscriber stations requires that the beam width (measured in degrees) be of at least a minimum angle of separation in order to service the subscriber stations simultaneously. Also, it is well known in the art of beamforming and SDMA systems that a minimum angle of separation between subscribers is necessary in order to avoid errors from interference (greater then 4 degrees of separation for bit error rate of zero).

3. Furthermore, in response to applicant's argument that there is no suggestion to combine the references (page 10-11 of the remarks), the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, both SCHERZER and GORANSSON are both related in the field of beamforming used within a communication system. Specifically, GORANSSON was used to show that the angle of arrival is substantially similar to angle of departure when used to determine mobile position.

Regarding amended independent claim 26, as with claim 2, positioning of the subscriber stations are achieved through detection of angle of arrival (col. 7, lines 44-65), which suggests an angle of separation constraint being imposed on the subscriber stations. Servicing of multiple subscriber stations requires that the beam width (measured in degrees) is of at least a minimum angle of separation in order to service the subscriber stations simultaneously. Also, it is well known in the art of beamforming and SDMA systems that a minimum angle of separation between subscribers is necessary in order to avoid errors from interference (greater then 4 degrees of separation for bit error rate of zero). The limitation "to schedule transmission to each receiver on an appropriate beam of the multi-beam antenna" can be seen as transmission to a single beam or multiple beams.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 2, 3, 5- 7, 11, 13-15, 17-22, 24, 26, 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over SCHERZER et al (US 6,895,258 B1) in view of GORANSSON (US 2004/0121810 A1).

Regarding claim 2, SCHERZER discloses a method of scheduling transmissions from a multi-beam transmitter to a plurality of receivers (abstract) comprising: determining an angle for each of the plurality of receivers (abstract, column 6:line 65-column 8:line 15; column 18:line 23-column 19:line 50) location of receivers are determined by using an estimated angle of arrival, which is used to determine scheduling of the receivers.); scheduling transmission to receivers based upon separation between angles between scheduled receivers (abstract, column 6:line 65-column 8:line 15); wherein a minimum angle of separation constraint is imposed that requires any two receivers which are scheduled during a given scheduling interval to have angles of departure separated by at least a first minimum angle of separation (column 6:line 65-column 8:line 15; column 10:lines 24-60; beam width determination is made based on AOA and fading rate information, a minimum width is necessary to provide acceptable error levels between subscribers). Although SCHERZER discloses using an angle of arrival in scheduling determination (column 6:line 65-column 8:line 15), SCHERZER does not disclose the use of an angle of departure in place of an angle of arrival. GORANSSON discloses the use of an angle of departure in place of an angle

of arrival (paragraph 15). Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify SCHERZER to use an angle of departure in place of an angle of arrival, as they are both reasonably the same when determining a users position.

Regarding claim 3, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses wherein the receivers are scheduled by: in sequence, selecting a receiver as a function of a performance metric, subject to said constraint (column 6:line 65-column 7:line 19).

Regarding claim 5, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses wherein the receivers are scheduled by, in sequence: a) scheduling a first receiver (column 6:line 65-column 8:line 15; column 18:line 23-column 19:line 50); b) determining a receiver of remaining receivers which has a largest angle of separation with previously scheduled receivers and scheduling that receiver subject to the constraint (column 6:line 65-column 8:line 15; column 18:line 23-column 19:line 50).

Regarding claim 6, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses further comprising for each scheduling interval: logically dividing the receivers into low priority receivers and high priority receivers (Figure 7; column 18:line 24-column 19:line 31; column 19:line 44-column 20:line 24); scheduling the high priority receivers before scheduling the low priority receivers (Figure 7; column 18:line 24-column 19:line 31; column 19:line 44-column 20:line 24).

Regarding claim 7, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses further comprising for each scheduling interval: logically dividing the receivers according to at least three groups each having a respective priority ranging from lowest to highest (column 18:line 24-column 19:line 31; column 19:line 44-column 20:line 24); scheduling the groups of receivers in decreasing order of priority (column 18:line 24-column 19:line 31; column 19:line 44-column 20:line 24).

Regarding claim 11, see the rejections of the parent claim concerning the subject matter these claims are dependent upon. SCHERZER further discloses wherein the separation constraint is applied to each of a plurality of sectors being serviced by a wireless network node (column 6:line 65-column 8:line 15).

Regarding claim 13, see the rejections of the parent claim concerning the subject matter this claim is dependent upon. SCHERZER further discloses further comprising: determining if there is any pair of receivers of different sectors which have angles of departure separated by less than a second minimum angle of separation (column 19:line 44-column 20:line 44); for each such pair of receivers, eliminating one of the pair of receivers from consideration for scheduling (column 19:line 44-column 20:line 44).

Regarding claim 14, see the rejections of the parent claim concerning the subject matter this claim is dependent upon. SCHERZER further discloses wherein the one of the pair of receivers eliminated from consideration is selected on the basis of cumulative throughput, with the receiver having higher cumulative throughput being eliminated (column 19:line 44-column 20:line 44).

Regarding claim 15, see the rejections of the parent claim concerning the subject matter this claim is dependent upon. SCHERZER further discloses further comprising: at a beginning of scheduling for each scheduling interval, eliminating at least one receiver from consideration for scheduling (column 19:lines 15-43).

Regarding claim 17, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses wherein the multi-beam transmitter comprises an adaptive beamforming transmitter (column 6:lines 13-42), the method further comprising performing adaptive beamforming for the scheduled receivers (column 6:lines 13-42).

Regarding claim 18, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. However, SCHERZER does not disclose wherein the multi-beam transmitter generates a plurality of substantially fixed beams which are individually directable, the method further comprising directing each of the substantially shaped beams. GORANSSON discloses wherein the multi-beam transmitter generates a plurality of substantially fixed beams which are individually directable, the method further comprising directing each of the statically shaped beams (Figure 4; paragraph 41-44). Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify SCHERZER to provide a fixed multi-beam transmitter, as taught by GORANSSON, as this allows the system to simplify computation when interference is not an issue.

Regarding claim 19, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses wherein the multi-

beam transmitter is a fixed multi-beam transmitter which generates an array of beams which are collectively steerable to a plurality of fixed rotational states, and individually activatable (column 6:lines 13-42; column 14:lines 14-43).

Regarding claim 20, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses a transmitter adapted to implement a method according to claim 1 (column 6:lines 13-42; column 14:lines 14-43).

Regarding claim 21, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses wherein the transmitter is in the form of a network access point (column 3:line 56-column 4:line 4).

Regarding claim 22, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses a system comprising: a wireless network node adapted to implement a method according to claim 1 (column 3:line 56-column 4:line 23); a plurality of receivers (column 18:line 24-column 19:line 31;).

Regarding claim 24, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses a computer readable medium having instructions stored thereon for implementing a method according to claim 1 (implementation of the scheduling of claim 1 inherently require a memory of some form which contain a program to calculate the scheduling of receivers).

Regarding claim 26, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses a transmitter comprising: a multi-beam antenna (column 6:lines 13-42; column 14:lines 14-43); a scheduler adapted to determine an angle of departure for each of a plurality of receivers and to schedule transmission to each receiver on an appropriate beam of the multi-beam antenna based upon separation between angles between scheduled receivers (column 6:line 65-column 8:line 15); wherein a minimum angle of separation constraint is imposed that requires any two receivers which are scheduled during a given scheduling interval to have angles of departure separated by at least a first minimum angle of separation column 6:line 65-column 8:line 15; column 10:lines 24-60; beam width determination is made based on AOA and fading rate information, a minimum width is necessary to provide acceptable error levels between subscribers). Although SCHERZER discloses using an angle of arrival in scheduling determination (column 6:line 65-column 8:line 15; column 18:line 23-column 19:line 50), SCHERZER does not disclose the use of an angle of departure in place of an angle of arrival. GORANSSON discloses the use of an angle of departure in place of an angle of arrival (paragraph 15). Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify SCHERZER to use an angle of departure in place of an angle of arrival, as they are both reasonably the same when determining a users position.

Regarding claim 28, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses wherein the multi-

beam antenna is an adaptive beamforming antenna (column 6:lines 13-42; column 14:lines 14-43).

Regarding claim 29, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. However, SCHERZER does not disclose wherein the multi-beam antenna is a fixed steering beam antenna. GORANSSON discloses wherein the multi-beam antenna is a fixed steering beam antenna (Figure 4; paragraph 41-44). Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify SCHERZER to provide a fixed multi-beam transmitter, as taught by GORANSSON, as this allows the system to simplify computation when interference is not an issue.

Regarding claim 30, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER discloses wherein the multi-beam antenna generates a plurality of beams having substantially fixed shapes which are individually directable (column 6:lines 13-42; column 14:lines 14-43).

Regarding claim 31, see the rejections of the parent claim concerning the subject matter this claims is dependent upon. SCHERZER further discloses wherein the transmitter is in the form of a network access point (column 3:line 56-column 4:line 4).

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over SCHERZER et al (US 6,895,258 B1) in view of GORANSSON (US 2004/0121810 A1) as applied to claim 3 above, and further in view of WONG et al (US 6,330,460 B1).

Regarding claim 4, see the rejections of the parent claim concerning the subject matter this claim is dependent upon. SCHERZER further discloses wherein the

performance metric is cumulative throughput (column 6:line 43-64). However, the combination of SCHERZER and GORANSSON does not disclose wherein in sequence, selecting a receiver as a function of the performance metric comprises: a) determining a receiver with a lowest cumulative throughput and scheduling that receiver; b) determining a receiver with a next lowest cumulative throughput and scheduling that receiver unless that receiver has an angle of separation with a previously scheduled receiver which does not satisfy the constraint; c) repeating step b) for additional receivers. WONG discloses a) determining a receiver with a lowest cumulative throughput and scheduling that receiver (column 11:lines 12-67); b) determining a receiver with a next lowest cumulative throughput and scheduling that receiver unless that receiver has an angle of separation with a previously scheduled receiver which does not satisfy the constraint (column 11:lines 12-67); c) repeating step b) for additional receivers (column 11:lines 12-67). Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combination of SCHERZER and GORANSSON to include a method of scheduling receivers with lower throughput requirements first, as taught by WONG, as this allows the system to service a greater number of receivers.

7. Claims 12 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over SCHERZER et al (US 6,895,258 B1) in view of GORANSSON (US 2004/0121810 A1) as applied to the parent claims above, and further in view of HSU et al (US 2004/0063438 A1).

Regarding claims 12 and 23, see the rejections of the parent claims concerning the subject matter these claims are dependent upon. SCHERZER further discloses wherein the wireless network node is a network access point (column 3:line 56-column 4:line 4). However, the combination of SCHERZER and GORANSSON does not disclose wherein each receiver is a local access point. HSU discloses wherein each receiver is a local access point (paragraph 45). Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combination of SCHERZER and GORANSSON to include local access point as receivers, as taught by HSU, as this allows a single controller to direct communication to all sectors available for transmission.

8. Claims 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over SCHERZER et al (US 6,895,258 B1) in view of GORANSSON (US 2004/0121810 A1) as applied to claim 25 above, and further in view of AGEE et al (US 2004/0095907 A1).

Regarding claim 27, see the rejections of the parent claim concerning the subject matter this claim is dependent upon. However, the combination of SCHERZER and GORANSSON does not disclose wherein the scheduler is adapted to determine an angle of departure for each receiver by receiving an angle of arrival information from each receiver, and deriving the angle of departure from the angle of arrival information. AGEE discloses wherein the scheduler is adapted to determine an angle of departure for each receiver by receiving an angle of arrival information from each receiver, and deriving the angle of departure from the angle of arrival information (paragraph 65, 66). Therefore it would have been obvious to a person of ordinary skill in the art at the time

the invention was made to modify the combination of SCHERZER and GORANSSON to calculate the angle of departure using angle of arrival information, as taught by AGEE, as this is a well known technique used in beam forming networks.

Allowable Subject Matter

9. Claims 8-10, 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: Regarding claim 8, SCHERZER discloses wherein scheduling the high priority receivers comprises: a) determining a high priority receiver with a poorest performance metric and scheduling that receiver (column 18:line 24-column 19:line 31; column 19:line 44-column 20:line 24); however, the prior art of record does not disclose b) determining a high priority receiver with a next poorest performance metric and scheduling that high priority receiver unless that high priority receiver has a minimum angle of separation with a previously scheduled receiver which does not satisfy the constraint; c) determining a low priority receiver which has a largest angle of separation with previously scheduled receivers.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ariel Balaoing whose telephone number is (571) 272-7317. The examiner can normally be reached on Monday-Friday from 8:00 AM to 4:30 AM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, George Eng can be reached on (571) 272-7495. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ariel Balaoing
Art Unit 2617

AB

GEORGE ENG
SUPERVISORY PATENT EXAMINER